# BRIEFER ARTICLES.

## TWO INSTRUCTIVE SEEDLINGS.

(WITH EIGHT FIGURES)

LUBBOCK,[1] in his work on seedlings, mentions not a few examples of lobed cotyledons, and of the appearance on such structures of trichomes of various kinds. The first of these peculiarities he attributes to the need of compact folding in the seed, which may often be of a shape to necessitate such lobing; for the second he gives no reason. A couple of seedlings which I have lately examined show facts which appear to bear directly upon the question both of lobation and of pubescence in cotyledons; these facts I present, together with a slight discussion of what they suggest.

The cotyledon of *Erodium cicutarium* L'Her. (*fig. 1*) has a distinct petiole and an oblique base, the right side, as viewed from above, being constantly higher than the lower. Into the lamina two indentations project, the right one always remaining the more distal. This is the normal condition for the species. But lobing is often carried further than this in the cotyledon, as seen in *fig. 2*, where the form represented is by no means extreme in this respect. Even when extra lobing occurs, the two indentations noted in the normal cotyledon still persist.

The reason for this lobing is perhaps a bit doubtful. Lubbock accounts very well for the oblique character, but seems hardly to make clear the cause of further changes in form, though not only for the species, but also for several others, he mentions them and takes notice of their somewhat inconstant character. To explain this, the slight variation in the shape of the seeds could hardly be regarded as sufficient. There seems, however, to be another view permissible, which may partly, at least, clear up the difficulty, if due care is taken not to press it too far. A glance at the adult plant shows leaves very finely divided, of increasing complexity as one passes from the nepionic, or early seedling leaves, where it is indeed comparatively well-developed,

[1] A contribution to our knowledge of seedlings. 2 vols. 1892.

up to the larger ones of the full-grown individual. Keeping in mind the fact that with the gradual change and increase in complexity of the adult in phylogeny, the representation of past adult stages is pushed further and further back in the ontogeny of the plant, one does not find it at all difficult to carry the idea a single step onward, and to consider the changes in cotyledonar form as influenced by this acceleration in development. Lubbock states that the lobing is perhaps deeper in *E. cicutarium* than in the other species, which are also less lobed or pinnatifid in the adult. As regards the extra lobing in cotyledons of *E. cicutarium*, therefore, I am inclined to adopt the view that acceleration in development supplies the most plausible reason, and to recognize the possibility of accounting thereby for the two constant lobes as well.

That lobation may take place for the sake of compact folding seems, however, fully to be demonstrated by the other seedling with which I am to deal. The genus Amsinckia has deeply parted cotyledons (*fig.* 7), but the following leaves throughout the life of the plant are simple, lanceolate, and entire. Hence it is equally possible that in *E. cicutarium* such lobes as are of a constant nature may likewise be due to this cause, as argued by Lubbock. Researches upon the seedlings of simpler leaved species of Erodium would give interesting evidence upon this point.

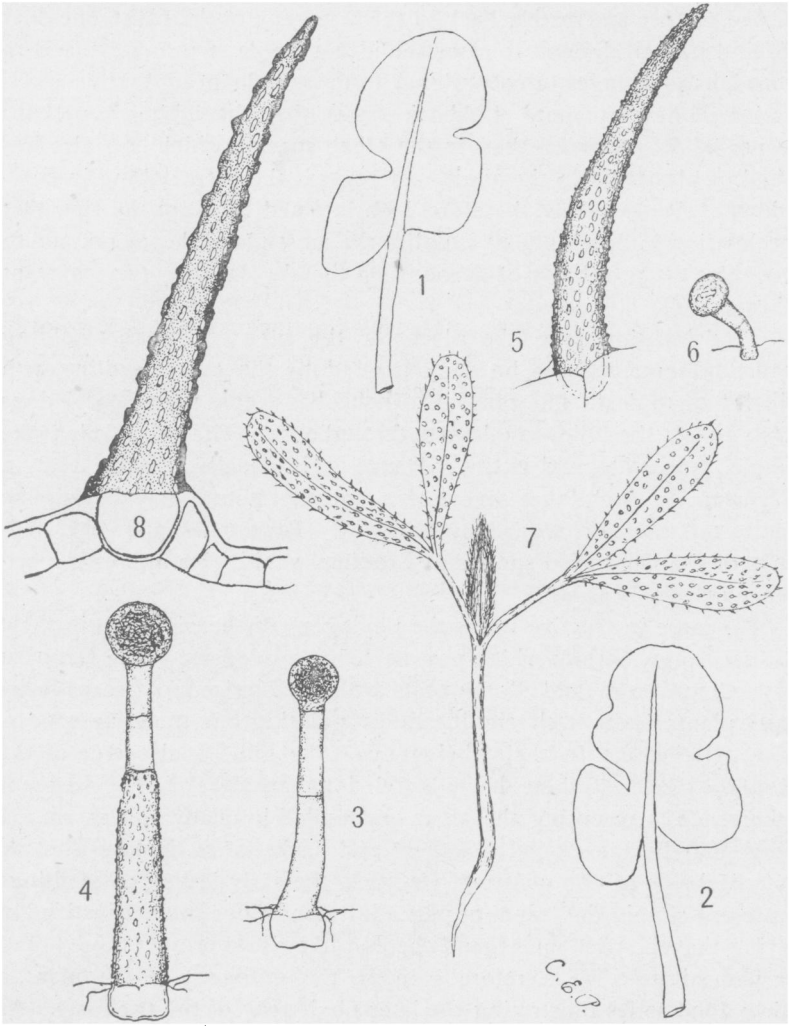
Far more instructive seems the phylogeny of the trichomes in these two seedlings, both of which possess hairy cotyledons. The fact that both Geraniaceae and Boragineae are characterized so generally by hairy plants is in itself significant as pointing out the early appearance of trichome in their phylogeny. The same is also true of the Hydrophyllaceae, where hairy cotyledons are likewise of frequent occurrence. Accepting the views expounded by many writers, among whom may be mentioned Schäffer[2] and Jackson[3] as dealing with the botanical side of the question, viz., that the early leaves of seedlings represent closely the leaves of past adult conditions, we are justified in saying that the trichomes found thereon likewise represent those found on past adults. We therefore gain, in the ontogeny of the plant, a fairly good series illustrating the later phylogeny of the trichome. As

[2] Ueber die Verwendbarkeit des Laubblattes der heute lebenden Pflanzen zu phyletische Untersuchungen. Abhandl. naturwiss. Ver. Hamburg **13**: 36 pp.

[3] Localized stages in the development of plants and animals. Mem. Boston Soc. Nat. Hist. **5**: 89–153. *10 pls.* 1899.

with the lobing, it is easy to suppose that the earlier stages may be thrown back upon the cotyledon.

The examination of *Amsinckia tessellata* Gray, the species used,




FIGS. 1–6, *Erodium cicutarium:* *1*, normal cotyledon; *2*, cotyledon with extra lobes; *3*, glandular hair on cotyledon; *4*, intermediate stage from early nepionic leaf; *5*, trichome of adult leaf; *6*, retrograde gland from adult leaf.— FIGS. 7, 8, *Amsinckia tessellata:* *7*, seedling; *8*, trichome of adult leaf.

brings to light little of importance. The trichome of the adult leaf (*fig. 8*) is large, heavy, and rough warty; that of the cotyledon is already somewhat roughened but is much smaller and less highly tuberculate. *Erodium cicutarium*, on the other hand, shows a definite series of structures, all of which are apparently phylogenetically descended from one of the number.

The hair found on the cotyledon of *E. cicutarium* (*fig. 3*) is glandular, consisting of a round, single celled head, and of two or three stalk cells, the walls of which, even under high power, appear perfectly smooth. No other modified epidermal structures occur in the cotyledons. The glands upon the petiole are similar, often longer stalked.

Upon the lamina of an early leaf may be found structures of three kinds. The first is the gland already described; this, however, is far less common here than on the cotyledons. A second is a modification of the first by the heavy cutinization and roughening of the basal cell (*fig. 4*). This type is usually somewhat larger than the earlier gland. The third structure is a simple, rough warty, pointed trichome (*fig. 5*). On a leaf of this stage the last two mentioned occur in about equal proportions. On the petiole the long stalked gland of the cotyledon seems to maintain its position, but even here the walls of its basal cell begin to show a thickening and more or less of the tubercular character.

In the mature leaf, the simple, unicellular, thickened, and tuberculated point constitutes an almost continuous covering over the surface. The individual trichomes are greatly enlarged and elongated. In addition to this form there is present a smaller number of minute glands (*fig. 6*), short stalked and with heads far inferior in size to those of the cotyledonar glands, these still maintaining the primitive thin walled character. The other forms are almost completely absent.

This series seems to show a variation of the primitive glandular structure along two lines during the phylogeny of the plant. The first of these lines demonstrates the peculiar development, out of a glandular structure, of a simple, rough warty point; the second, the mere degeneration of the stalked gland. The gland of the nepionic leaf (*fig. 4*) seems undoubtedly to be a form intermediate between the primitive gland (*fig. 3*) and the rough warty point of the adult (*fig. 5*), the latter being evolved from the former by the modification of the basal cell and the gradual cessation in development of the upper parts.

In one case I found a poorly developed gland on the tip of a pointed trichome in an adult leaf, but this, though a very instructive intermediate stage, is certainly an exceptional occurrence. As a rule these points are well developed early in the ontogeny of the leaf, and it seems very doubtful whether each one passes through a primitive glandular stage in its development.

As regards the small glands still present, it may be pretty safely concluded that they are a somewhat retrograde condition of the primitive glands. One of such retrograde glands is represented in *fig. 6*, of equal relative size with the other figures of trichomes. These are of much more frequent occurrence on the petiole, where also the stalked glands persisted longest unmodified, than on the lamina. It is also worthy of note that they reach their highest development at an earlier period in the unfolding of the leaf than do the rough warty points, another fact which gives evidence of their direct descent from a primitive structure.—CARLETON E. PRESTON, *Harvard University*

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## SOME LITTLE KNOWN PLANTS FROM FLORIDA AND GEORGIA.

THE collections made by Mr. A. H. Curtiss during the past summer contain a number of species, which apparently are unrecorded from Florida and Georgia. Among the more interesting of these are the following:

NAJAS CONFERTA A. Br. in Sitzungsb. Ges. Naturf. Fr. Berlin 17. 1868. This species, formerly known only from Brazil and the West Indies, was found abundantly in tidal creeks near Milton at the head of Pensacola bay, Florida, August 3, 1901 (no. 6858.)

FIMBRISTYLIS SCHOENOIDES Vahl. Enum. 2 : 286. An Indian and Australian plant collected by Mr. Curtiss in Walton co., Florida, in 1886, and again on September 23, 1901, by roadsides and in miry spots near Milligan, Santa Rosa co., Florida (no. 6912).

MAYACA FLUVIATILIS Aublet, Pl. Guian. 1 : 42. *pl. 15* (*M. Aubletii* Schott & Endl.) A species described from South America, but found fruiting by Mr. Curtiss in creeks at Milligan, Florida, September 24 (no. 6913). Readily distinguished from *M. Aubletii* Michx. (*M. Michauxii* Schott & Endl.) by its very short thick peduncles.

POEPALANTHUS PILULIFER Koenicke in Mart. Fl. Bras. $3^1$ : 426. *pl. 55. fig. 1.* Plants found by Mr. Curtiss in moist cultivated ground